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German Net Investment and the Cumulative Real Wage Position 1925-1929. On a Premature Burial of the *Borchardt Debate*

Mark Spoerer*

Obviously, Weimar suffered from a bitter distributional struggle, and it is difficult not to take the side of the underdog. Statistics are cold, and it is very hard to warm up to Weimar's industrialists.
G.D. Feldman[1]

Abstract: In HSR's last issue, Hans-Joachim Voth challenged thé 'crisis before the crisis' hypothesis introduced by Knut Borchardt in 1979, resulting in a lively discussion among German and British economic historians of the Weimar Republic, the 'Borchardt Debate'. Whereas the discussion so far has focused on the causes, Voth questions the main symptom and thus the whole debate: according to him, Weimar's investment record was not significantly different from the German Empire's, and empirical identification of wage pressure, considered as the main cause for Weimar's economic weakness in Borchardt's seminal paper, was due to inappropriate measurement. Voth concludes that »the debate over the weakness of the Weimar economy should be over«. - This paper challenges Voth's methodology and the logic of his inferences. Using a variety of statistical sources and both his own and a more adequate measurement concept as well, it is argued that Weimar's net investment ratio was considerably lower than that of the Empire. Furthermore, it is shown that Voth's own calcula-

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[1] G.D. Feldman (1985), 'Weimar from Inflation to Depression: Experiment or Gamble?', in idem (ed.), *Die Nachwirkungen der Inflation auf die deutsche Geschichte 1924-1933,* München, pp. 385-401, here p. 395.

tions of labor's share of the real product confirm Borchardt's wage pressure argument rather than contradict it. Hence, Voth's arguments are not sufficient to reject the Borchardt Hypothesis, much less to end the Borchardt Debate.

Fifteen years ago, Knut Borchardt questioned the then-prevailing picture of relatively stable economic development in Germany between 1925 and 1929 - 'The Golden Twenties' - by arguing that the Weimar economy suffered from severe structural problems and was therefore unviable in the long run. This new interpretation, combined with his provocative theses about Brüning's *Zwangslagen* (constraints), led to a vivid and very productive debate about the Weimar economy. Borchardt, soon joined by Harold James, reintroduced arguments which had been made by the entrepreneurs in the contemporary debate over high wages, too large social security benefits and excessive taxation. Growth of real wages was said to outstrip that of labor productivity, thus causing a 'profit squeeze' which obstructed capital formation necessary for the rationalization of industry. In this view, the Weimar economy was a victim of distributional conflicts.[2]

Other economic historians either conceded that the late 1920s could no longer be considered as a normal period of stabilization but blamed other causes, or restricted the idea of Germany's structural weakness to the monetary sector only. Using a more adequate productivity measure to calculate the cumulative real wage position (labor's share of output) than Borchardt, Carl-Ludwig Holtfrerich argued that real wages were not too high. In his opinion, the ability of German industry to invest was restrained by the disintegration of the world economy and high interest rates in Germany. He also criticized the high degree of concentration and cartelization of industry.[3] This point had already been

[2] K. Borchardt (1979), 'Zwangslagen und Handlungsspielräume in der großen Wirtschaftskrise der frühen dreißiger Jahre: Zur Revision des überlieferten Geschichtsbildes', *Jahrbuch der Bayerischen Akademie der Wissenschaften,* München, pp. 85-132; English translation of a slightly revised version in: idem (1991), 'Constraints and room for manoeuvre in the great depression of the early thirties: towards a revision of the received historical picture', in idem, *Perspectives in Modern German Economic History and Policy,* New York, pp. 143-160, 238-258; cf. also Borchardts latest contribution to the debate: idem (1990), 'A Decade of Debate About Brüning's Economic Policy', in J. v. Kruedener (ed.), *Economic Crisis and Political Collapse. The Weimar Republic 1924-1933,* New York/Oxford/Munich, pp. 99-151. H. James (1988), *Deutschland in der Weltwirtschaftskrise 1924-1936,* Stuttgart, pp. 397-402; English original: idem (1986), *The German Slump. Politics and Economics 1924-1936,* Oxford.

[3] C.-L. Holtfrerich (1984), 'Zu hohe Löhne in der Weimarer Republik?', *Geschichte und Gesellschaft* 10, pp. 122-141, here p. 135; idem (1990), 'Was the Policy of Deflation in Germany Unavoidable?', in J. v. Kruedener (ed.), *Economic Crisis and Political Collapse. The Weimar Republic 1924-33*, New York/Oxford/Munich, pp. 63-80, here pp. 78f.; cf. also J. v. Kruedener (1990), 'Introduction: The »Borchardt

pointed to in the contemporary debate by Joseph Schumpeter anticipating Borchardt's argument in a strikingly similar way.[4] In a recent monograph, Theo Balderston challenged the idea of Weimar's real economy being structurally ill. According to his view, entrepreneurs had had excessively optimistic expectations and thus had invested too much in the 1920s. When they realized that their expectations had not been met, they blamed high wages and high taxes, which were variable in the short run in contrast to their excess capacities, which were sunk costs. Disappointed, entrepreneurs curbed investment; they were on »a 'strike' of capital«. In Balderston's view, the resulting business pessimism and inflation anxiety were the main causes for the severity of the German slump.[5]

In a recent paper published in this journal, Hans-Joachim Voth puts the whole debate into question.[6] He argues that between the prewar period and the years 1925-29 there was (A) no significant decrease in real net investment per capita, and (B) no relevant increase in the German worker's cumulative real wage position (CRP). Therefore, Voth questions not only Borchardt's indeed much disputed hypothesis on the causes of the alleged weakness of the Weimar economy (B), but its main symptom (A) and thus the whole debate, too. His line of reasoning is as follows:

(A1) So far, in the debate over Weimar's economic weakness in general and low investment in particular, scholars have not taken into account that a comparison between real net investment of the prewar period and the late 1920s has to be adjusted for the dramatic change in the demographic regime which took place after 1913 (p. 130).

(A2) Calculation of real capital growth on per capita basis changes the results (p. 131).

Debate« on the Failure of Economic Policy at the End of the Weimar Republic', in ibid., pp. XI-XXDC, here p. XXV.

[4] Cf. J.A. Schumpeter (1927), 'Die Arbeitslosigkeit', *Der Deutsche Volkswirt* 1, pp. 729-732, and: idem (1929), 'Grenzen der Lohnpolitik', in: ibid. 3, pp. 847-851.

[5] T. Balderston (1993), *The Origins and Course of the German Economic Crisis. November 1923 to May 1932,* Berlin, pp. 382 (quote), 401, 405-407, 412f.

[6] H.-J. Voth (1994b), 'Much Ado About Nothing? A Note on Investment and Wage Pressure in Weimar Germany, 1925-29', *Historical Social Research* 19/3, pp. 124-139. Cf. an earlier article of Voth stressing, among others, the same points: idem (1993a), 'Wages, Investment, and the Fate of the Weimar Republic: A Long-term Perspective', *German History* 11, pp. 265-292. Interesting enough, Voth started a still ongoing econometric debate with Albrecht Ritschl in late 1993 precisely in order to find the relevant causes for the Weimar Republic's low investment record, a fact he did not question in those papers; cf. idem (1993b), 'Investitionen in den »Goldenen Jahren« der Weimarer Republik', *Zeitschrift für Wirtschafts- und Sozialwissenschaften* 113, pp. 629-633; A. Ritsehl (1994a), 'Goldene Jahre? Zu den Investitionen in der Weimarer Republik', ibid. (114), pp. 99-111; H.-J. Voth (1994a), 'Zinsen, Investitionen und das Ende der Großen Depression', ibid. (114), pp. 267-281.

(A3) By using all tests, it can be shown that the difference between the average per capita capital stock growth rates of the two periods is not significant. Hence, the view that Weimar's investment record was poor, a point on which nearly everybody in the debate so far agreed[7], is rejected (pp. 133f., 139).

(B1) So far, calculations of the cumulative real wage position have been flawed by using an inadequate price index (pp. 135f.).

(B2) When using the appropriate price index, CRP figures no longer support Borchardt's thesis of an increase in worker's share of the output (pp. 138f.).

(C) If (A) and (B) hold, then Borchardt and the other participants in the debate have merely chased a phantom: »Unless the findings in this paper can be substantially revised by future research, the debate over the weakness of the Weimar economy should be over« (p. 139).

The intention of this paper is to show that Voth's results do not stand up to closer scrutiny, and that even if they did, they would not be sufficient to support his conclusion as stated above. Concerning the measurement of investment, the concept Voth claims to introduce is neither new nor the most adequate. His analysis is not only based on an arbitrarily chosen reference period, but also flawed by methodological mistakes. Furthermore, his calculations of the cumulative real wage position confirm Borchardt's wage pressure argument rather than contradict it.

(A1) Voth's terminology is not unequivocal. He nearly always terms the measure he claims to introduce into the debate »capital increase per capita« or »investment per capita« (pp. 131, 133f., 138). Yet, this measure was used by Borchardt for the years 1905-13 and 1925-29 in precisely the paper that started the 'Borchardt Debate', and by other scholars, too.[8] Their motivation for this adjustment was of course to account for territorial changes in the aftermath of the Treaty of Versailles. In fact, Voth does not calculate capital increase per capita, but the (real) »rate of expansion of capital stock per capita« (p. 131). And this is not, as his formula (2) (p. 133) implies, $\Delta K/N$[9], but $\Delta(K/N) / (K/N)$.[10] Hence, the method Voth claims to import from development economics into the debate has already been used by Borchardt and others. The only difference is that Voth's focus is on growth rates instead of levels.

[7] **A notable exception being Holtfrerich, who originally agreed to this point (Holtfrerich (1984), pp. 123, 135), but recently challenged this view: Holtfrerich (1990), pp. 70f.**

[8] **Borchardt (1979), p. 127; English translation in: idem (1991), p. 254: »The net investments *per capita* at constant prices...« (emphasis added). Other examples: A. Sommariva/G. Tullio (1987), *German Macroeconomic History. A Study of the Effects of Economic Policy on Inflation, Currency Depreciation and Growth*, Basingstoke/London, p. 19; Borchardt (1990), p. 128.**

[9] **Voth uses P for population instead of N.**

[10] **Using this measure - real capital stock growth rate per capita - it is possible to reproduce all of Voth's results, i.e. his tables 2 and 3, and figure 2 as well.**

(A2) How is it that both Borchardt and Voth use the same measurement concept but draw different conclusions? Whereas Borchardt compared the late 1920s with the years immediately preceding World War I (1910-13)[11], Voth chooses a longer perspective (1900-13). In search of an adequate reference period, two problems arise: should one compare periods with similar real product growth or similar capital formation growth? After solving this problem, were the years 1925-29 on the upper bound of the thus defined business cycle, or did they form a full cycle themselves with a trough in 1926? Needless to say, there are no reliable figures before 1925, and the crisis from 1930 onwards was too severe to be compared to earlier ones in the prewar period. Whatever the answer to the first question might be, it seems that the reference period chosen by Borchardt is one of substantial growth slightly above long term prewar average. Voth's period covers roughly two full business cycles with their troughs in 1901 and 1908, the former one being the deepest prewar crisis since the end of the so-called Great Depression (1873-1895). Since, as one might argue that Borchardt used figures above the average and Voth below the average, Table 1 also includes the figures for 1876 (see footnote 14) and 1905 to test whether the results are robust (Table 1).[12]

Table 1 compares population growth before and after World War I with two different measures of capital growth (net investment). As can be seen from column (i), population growth remained fairly constant before World War I but experienced a marked slowdown thereafter. Columns (ii) and (iv) are the unadjusted growth rates of capital stock in *Gewerbe,* a broader concept than industry (see notes to Table 1), and in the entire economy, respectively. It is clearly visible that growth rates of capital stock in *Gewerbe* was on average

[11] Borchardt (1979), p. 127; idem (1991), p. 254.

[12] Voth's and my recalculation's percentages differ only from .01 to .03 percentage points, in one case (c - Table 1, col. (iv), 1900-13) his percentage is 3.13, mine 3.23. Except for the latter one these differences might be explained by different calculation methods. Average annual growth rates are calculated here by exp((ln(capital stock in endyear)-ln(capital stock in startyear))/(endyear-startyear)>-1. In the last decade, considerable doubts have been raised concerning Hoffmann's data, cf. for the 19th century: C.-L. Holtfrerich (1983), 'The Growth of Net Domestic Product in Germany 1850-1913', in R. Fremdling/P.K. O'Brien (eds), *Productivity in the Economies of Europe,* Stuttgart, pp. 124-132; R. Fremdling (1988), 'German National Accounts for the 19th and Early 20th Century. A Critical Assessment', *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 75, pp. 339-357. Cf. the latter for the inter-war years, too, and: A. Ritschl (1990), 'Zu hohe Löhne in der Weimarer Republik? Eine Auseinandersetzung mit Holtfrerichs Berechnungen zur Lohnposition der Arbeiterschaft 1925-1932', *Geschichte und Gesellschaft* 16, pp. 375-402; idem (1992), 'Über die Höhe und Struktur der gesamtwirtschaftlichen Investitionen in Deutschland 1935-38', *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 79, pp. 156-176; idem (1994b), *On the Origins and Course of the Great Depression in Germany: A Quantitative Assessment of Industrial Production and Aggregate Output Data, 1925-1938,* unpublished manuscript, Universität Pompeu Fabra, Dept. of Economics, September 1994.

Table 1: Population and Real Capital Stock Growth, Germany 1876-1913, 1925-29 (average annual growth rates, in %)

	population growth $\Delta N / N$ (i)	*Gewerbe*'s capital stock growth $\Delta K_G / K_G$ (ii)	growth of *Gewerbe* capital stock per capita $\Delta K_G/K_G - \Delta N/N$ (iii)	overall capital stock growth $\Delta K / K$ (iv)	growth of overall capital stock per capita $\Delta K/K - \Delta N/N$ (v)
1876-1913	1.20	4.84	3.60	a 3.00	b 1.78
1900-1913	1.38	4.22	2.80	c 3.23	d 1.82
1905-1913	1.32	4.46	3.10	3.31	1.97
1910-1913	1.23	4.67	3.40	3.43	2.18
1925-1929	.62	3.11	2.47	e 2.26	f 1.63
relative difference 1925-1929 to:					
1876-1913	-49	-36	g -31	-25	h -8
1900-1913	-55	-26	i -12	j -30	k -10
1905-1913	-53	-30	l -20	-32	m -17
1910-1913	-50	-33	n -27	-34	o -25

Notes: All figures calculated with price base 1913. Data for industry only not available. *Gewerbe* includes mining, industry, crafts, trade, banks, insurance, and transport except for railroads and postal services. Last four lines not growth rates, but relative differences in per cent. Cols, (iii), (v) calculated directly from the data, thus minor differences to (ii)-(i) and (iv)-(i), respectively.

a - o see text below, c - f, j, k can be found in Voth's Table 2, cols. 2, 3, lines 1, 2, 4 (p. 131, minor differences).

Source: Calculated from Walther Hoffmann et. al. (1965), *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts,* Berlin/Heidelberg/New York, pp. 173f, 215, 254.

faster than in the aggregate. Apart from this effect, which results from the still ongoing process of industrialization in late 19th century Germany, both series exhibit fairly similar characteristics. In particular, they both show a sharp slowdown in the years 1925-29. To adjust for the effect of population growth, the obvious procedure is to subtract population growth from capital growth. This is done in column (iii) for *Gewerbe* and in column (v) for the entire economy. Voth makes a lot of this adjustment but apparently overlooks that, to my knowledge, all contributions to the Borchardt Debate have discussed only adjusted figures of this sort. Of course, as population growth slowed down in the 1920s, the adjusted per-capita series (iii) and (v) exhibit a considerably lower slowdown in capital accumulation than the unadjusted series do. Voth focuses his analysis on k, the relative difference between the adjusted growth rates per capita in the periods 1900-13 (d) and 1925-29 (f). Is a 10% decrease neglectable, as Voth claims, or not?

(A3) In his paper, Voth proceeds by calculating the absolute differences of the unadjusted and adjusted average annual growth rates of overall net investment c - e - .90[13] and d - f = .19, respectively. Using a parametric (t-) and a non-parametric (Mann-Whitney U-) test, he then tests whether the differences of the means are statistically significant He claims to show[14] that the difference of the unadjusted means, .90, is highly significant, but that both methods fail to identify a statistically significant difference between the adjusted means, .19. This, he infers, indicates that there probably is none. Thus, »Weimar s investment record was not significantly different from the Empire's« (p. 134).

However, if the test statistics lead him not to reject the null hypothesis (H_0 here: the two samples' means, d and f, belong to the same population, the observed difference being sampling error), this does not necessarily imply that the null hypothesis is 'true', that there is indeed no meaningful difference

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[13] Probably due to a different calculation method, his figures slightly deviate from mine (c - e - .97 in my Table 1), see footnote 12.

[14] As reference period, Voth so far considers the years 1900-13, and thus the means he calculates, c and d, refer to this period. So it is unclear why in the significance tests he performs, he suddenly shifts the beginning of his prewar time series to 24 years earlier, now reaching from 1876-1913 instead of 1900-13 (p. 133). Voth neither explains this shift nor justifies the year 1876, thus far not considered as a benchmark in German economic history. How can he analyze the significance of the means' differences of 1900-13 (unadjusted: c-3.23%, adjusted: d-1.82%) by using the period 1876-1913, which has different means (unadjusted: a«3.00%, adjusted: b=1.78%)? This becomes even more incomprehensible if one recalculates the t-test for the period Voth himself originally has chosen, 1900-13: both the significance levels of the t-test and even the significance level of Levene's test for equality of variances improve in his sense (mean difference = .9417, standard deviations = .402 (1900-13) and .870 (1925-29), Levene's test for equality of variances: p-.Oll; t-value for equal variances * 3.29, two-tailed significance - .004). Choosing the reference period 1909-13 also gives a statistically significant difference of the unadjusted means. So, why does he extend the reference period, and why to 1876?

between d and f. An inference like this risks the so-called 'type II error': not rejecting a false null hypothesis.[15] The fact alone that Voth's second period under consideration, 1925-29, has only five observations, should have suggested caution. Not finding significant t-statistics is not too surprising with such a small sample. Yet, Voth draws the above quoted conclusion that the investment pattern hardly differed. It should be clear now that this conclusion, especially in Voth's definitive formulation (pp. 138f.), is unwarranted.

Furthermore, if one uses tests of significance developed for sampling theory to make inferences about time series[16], the periods chosen should be at least similar to 'samples', i.e. chosen by some random-like procedure from a 'population', which is here the set of possible reference periods for the prewar years. Looking again at Table 1, it becomes clear that the reference period Voth has chosen, 1900-13, is very favorable to his thesis. Whether the difference of 10% he looks at (k) is substantial or not, is indeed not clear. Comparisons with h, m, and o show that Voth's results strongly depend on the reference period. Going back to 1876 narrows the gap of the average annual growth rates per capita between the prewar period and 1925-29 to 8% (h). But it widens considerably when looking at the period 1905-13 (m), which still has a trough in 1908, and it becomes dramatic when looking at the period Borchardt has favored, 1910-13 (o). When comparing the relative differences of adjusted *Gewerbe* capital stock growth (column (iii)), the period Voth has chosen is clearly the minimum among the 'samples' considered here: Comparing 1925-29 with 1900-13 shows a relatively small decrease of 12% (i), but compared to every other reference period (g, l, n), the adjusted growth of *Gewerbe* capital stock slowed down considerably in 1925-29. This indicates that the mean of Voth's 'sample' period 1900-13 is considerably smaller than the mean of the 'population', the set of prewar reference periods. In a way, this is a 'sampling error', but one which should be blamed on lack of prudence rather than chance. Hence, it should be clear by now that even if one accepts per capita investment as an adequate measurement concept for investment behavior, Hoffmann's figures do not support Voth's thesis.

Yet, is the concept he uses adequate? In order to analyze investment behavior, most economic historians usually relate net investment, ΔK, to net real product, Y (that is, the ratio of net investment to net national or net domestic product).[17] Again, it should be emphasized that in the German case, the need for this is all

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[15] Cf. W.H. Greene (1990), *Econometric Analysis*, p. 123.

[16] Critical of this from a purist's point of view: D.N. McCloskey/S.T. Ziliak (1993), *The Standard Error of Regressions,* unpublished manuscript, University of Iowa, Dept. of Economics, December 1993, pp. 6f.

[17] E.g. Borchardt (1979), p. 127; Holtfrerich (1990), p. 71; D. Petzina (1990), 'Was There a Crisis Before the Crisis? The State of the German Economy in the 1920s', in J. v. Kruedener (ed.), *Economic Crisis and Political Collapse. The Weimar Republic 1924-1933,* New York/Oxford/Munich, pp. 1-19, here p. 12.

the more obvious because of territorial changes after World War I. Interestingly enough, this is not only recognized by Voth (pp. 126, 128, 138f.[18]), but used in his own earlier work.[19] Nevertheless, he must have overlooked that by using real product as denominator, changes in the population N are still taken into account a slower growing labor force requires less real net investment to sustain a constant capital per capita level (K / N), and it produces a lower real product, too. Furthermore, choosing Y instead of N as denominator is more adequate whenever the demographic environment is in motion: after a sudden demographic change as in the case discussed here, during an adjustment period of a full generation's life, society becomes older, until a new, higher equilibrium average age is reached.[20] Adjusting for population (ΔK / N) or population growth (Δ(K/N) / (K/N)) implies that if society is ageing, babies - whose ratio of the population decreases - 'need' the same capital stock as adults, whereas using real product (ΔK / Y) fully takes this kind of cohort effect into account. As the Weimar Republic's society was ageing, it should be noted that *a priori* ΔK / Y is favorable to Voth's argumentation.

As the phenomenon to be explained here is Weimar's supposed investment weakness, it is reasonable to take a look not only at capital formation of the entire economy (ΔK), but also at that of *Gewerbe* (ΔKQ) as a proxy for industry for which data are not available. As a second refinement, inventory investment should be excluded to focus on net investment in fixed assets (ΔK*). What Y is adequate? Standard economics textbooks recommend net national product (NNP) at market prices[21], but as the focus here is on the competitiveness of the German economy and not of the Germans, net domestic product at market prices (NDP) should be preferred, if the data are available.

What sources should be used? As Hoffmann's data are still standard and Voth relies on them, ΔK / Y and ΔKQ / Y_G will be calculated from Hoffmann (Table 2, cols, (i), (v)). Yet, more adequate figures have been constructed or rediscovered in the last decade. Holtfrerich has constructed NDP growth factors for 1851-1913 out of Hoffmann's data which are more adequate than Hoffmann's own aggregated figures for NDP and show slightly larger growth rates on the average (ii).[22] For the years after 1923, Ritschl has emphasized that the contemporary output data are more plausible than those of Hoffmann who probably sacrificed precision in the inter-war years to have a consistent time series stretching back to 1850.[23] Hence, for 1925-29, the data of the official

[18] Apparently, Voth continously confounds gross domestic product with net national product here. Hoffmann did not publish any GDP or GNP figures.

[19] Voth (1993a), p. 274.

[20] This argument has been formalized in growth theory, e.g. G.T. McCandless jrTN. Wallace (1991), *Introduction to Dynamic Macroeconomic Theory. An Overlapping Generations Approach*, Cambridge (Mass.)/London, pp. 245-248.

[21] E.g. A. Stobbe (1980), *Volkswirtschaftslehre I. Volcswirtschaftliches Rechnungswesen*, 5th ed., Berlin/Heidelberg/New York, p. 374.

[22] Holtfrerich (1983), p. 130; cf. Fremdling (1988).

[23] Ritschl (1994b), p. 4.

Statistisches Jahrbuch and the *Konjunkturstatistisches Handbuch*, a publication of the semi-official and well respected *Institut für Konjunkturforschung* (IfK) are used in columns (iii) and (iv). They also contain ΔK^*, which is not available for the prewar period. In a recent paper, Ritschl (1994b) proposes a correction procedure for Hoffmann's data of output in metal-processing from which new figures for Hoffmann's industrial production and NDP can be calculated. This correction is implemented in column (v) for *Gewerbe* output.[24] It should be emphasized that it is impossible to exclude inventory investment from Hoffmann's data for both K and K_G.[25] TO check the results below, it might have been sensible to look at gross investment too, especially because estimates of depreciation are notoriously inaccurate.[26] But deriving meaningful results would require figures of either the gross national or gross domestic product in the denominator, which are not available.[27]

What time periods should be considered? As the purpose here is to show that Weimar's investment record was indeed low, it is sufficient to compare the period 1925-29, which definitely was not at the lower bound of the business cycle, with full business cycles. Hence, except for 1910-13, the prewar reference periods chosen in Table 2 form full business cycles with their period lengths determined as recommended by Holtfrerich (Table 2).[28]

Apart from being conceptually more adequate, adjusting net investment by real product rather than population yields results which are robust to the choice of reference period. From 1925-29, the average net investment ratio was about 11%, from 1900 to 1913 about 15% (col. (i)).[29] The relative difference between the net investment ratio of the prewar period and 1925-29 is about -25% to -30% both in *Gewerbe* and the aggregate economy, whatever reference period is considered. One has to go back into the 1880s, in the middle of the Great Depression, to find periods with a similar low average of 11%.

Furthermore, Weimar's net investment record has two characteristics that underline the irregularities of this period: even in the *Gründerkrise* of the mid 1870s there were no such low net investment ratios for the aggregate economy as in the years 1926 and 1929. Taking into account that output and probably investment levels, too, were low in World War I, during the hyperinflation, and

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[24] Not revising Hoffmann's industrial output data by the procedure Ritschl has proposed leads to slightly lower figures in col. (v): average 1927-29: 9.53%, average 1925-29: 8.75%. The relative differences to the prewar periods increase to 32-34%.

[25] Cf. Hoffmann (1965), pp. 215, 239-241, 244f.

[26] G. Gehrig (1961), 'Eine Zeitreihe fur den Sachkapitalbestand (1925 bis 1938 und 1950 bis 1957)', *IFO-Studien* 7, pp. 7-60.

[27] To construct GNP data from Hoffmann's NNP data, one might be tempted to add Gehrig's gross investment data to the NNP and subtract Hoffmann's net investment data. But as Hoffmann's data include inventory investment and Gehrig's not, these time series are not compatible.

[28] Holtfrerich (1983), p. 130.

[29] Slightly deviating figures in: Borchardt (1979), p. 127.

Table 2: Net Investment Ratios in *Gewerbe* and the Aggregate Economy, Germany 1871-1913, 1925-29 (average annual growth rates, in %)

	ΔK/Y Hoffmann (i)	standard deviation of (i)	ΔK/Y Hoffm., Holtfr. (ii)	ΔK/Y IfK, StatRA (iii)	ΔK*/Y IfK, StatRA (iv)	ΔKG/YG Hoffm., Ritschl (v)
1871-1913	12.87	2.71	°15.42			12.13
1874-1883	10.79	2.91	13.65			6.44
1883-1890	11.51	1.38	14.76			14.62
1890-1900	13.43	2.48	16.89			15.58
1900-1907	14.84	2.05	16.75			13.08
1900-1913	14.73	1.77	16.65			12.83
1907-1913	15.03	1.61	16.94			13.13
1910-1913	15.16	1.19	17.03			13.22
1925	12.80			12.33	7.80	12.35
1926	6.54			4.46	7.65	4.20
1927	15.21			15.53	9.24	14.59
1928	13.08			12.77	9.25	11.73
1929	7.26			6.25	7.96	4.30
1927-1929	11.85	3.36		11.52	8.82	10.21
1925-1929	10.98	3.44		10.27	8.38	9.44
relative difference 1925-1929 to:						
1900-1907	-26	+68				-28
1900-1913	-25	+95				-27
1907-1913	-27	+113				-28
1910-1913	-28	+189				-29

Notes for Table 2: Standard deviation data are not percentages. Last four lines not growth rates, but relative differences in per cent.

° Long-run comparisons with his data not recommended by Holtfrerich (1983), p. 127.

* Excluding inventory investment.

IfK - *Institut für Konjunkturforschung,* StatRA - *Statistisches Reichsamt.*

Sources and calculation methods:

(i) net investment (current prices) / net national product at market prices (current prices); Hoffmann (1965), pp. 259f., 825f. Using Hoffmann's deflated net investment and NNP data (prices 1913) instead does not change the picture. The relative differences even tend more to -30% than to -25%, and the relative differences of the standard deviations increase.

(ii) net investment (1913 prices) / real net domestic product at factor cost; Hoffmann (1965), pp. 257f., 455; Holtfrerich (1983), p. 130.

(iii) net investment (current prices) / net national product at factor cost (current prices); *Statistisches Jahrbuch für das Deutsche Reich 1938,* p. 565; *Konjunkturstatistisches Handbuch 1933,* p. 80; idem *1936,* p. 95; *Statistisches Handbuch von Deutschland 1928-1944* (1949), München, pp. 600, 604. Using the price index for producer goods *(Konjunkturstatistisches Handbuch 1936,* p. 104) as deflator for net investment and Hoffmann's NNP deflator (Hoffmann (1965), p. 601, col. 14) for NNP produces slightly higher averages for 1925-29: (iii) and (iv) increase to 11.45% and 9.29%, respectively.

(iv) as (iii), excluding net inventory investment (current prices).

(v) *Gewerbe* net investment (prices 1913) / *Gewerbe* output (prices 1913); Hoffmann (1965), pp. 257f., 424f., 454f. Hoffmann's figures for output of industry and crafts 1925-29 revised by Ritschl (1994b), p. 15.

in the post-stabilization crisis of 1924, the upswing of 1927/28 seems not to have been sufficient to have allowed for a full catch-up. Still more interesting is the standard deviation of 1925-29 which doubles the 1900-13 values and is still considerably larger than any other value in the period considered.[30] As the comparison between columns (iii) and (iv) shows, this erratic behaviour was partially driven by the destabilizing effect of inventory investment It should be emphasized that, when investigating 'investment weakness', inventory investment should be excluded and thus column (iv) is most adequate for the questions discussed here. Unfortunately, no comparable figures for the prewar period are available. Another interesting topic for future research is the apparent slowdown of *Gewerbe* investment relative to aggregate investment after the turn of the century.

Concentrating on the peak from 1927-29 only or changing from Hoffmann's to other sources (ii), (iii), does not change the overall impression: if Hoffmann's or Holtfrerich's data for the prewar years are reliable, then the net investment ratio in Weimar's 'Golden Twenties' had a much larger amplitude than any full business cycle after 1871 and, contrary to Voth's thesis, clearly

[30] This also holds for every 5-year-period from 1870-74 to 1909-13: The largest 5-year-period standard deviation is 2.55 (1874-78).

was about 25% to 30% lower than in any prewar period after the Great Depression.

(B1) Voth criticizes Ritschl for having calculated the cumulative real wage position (CRP) using a misleading denominator. What is the CRP? In the simple form used in the Borchardt Debate so far,

$$CRP = (W/P)/(Y/L),$$

with W = nominal wage, P = price level, Y = real product, and L = labor input. Hence, W / P is the real wage, and Y / L labor productivity.[31] Borchardt introduced this measure in order to illustrate his thesis that wage pressure induced a profit squeeze and thus led to low investment. The advantage of the CRP as compared to looking at merely real wages, is that it relates the latter to labor productivity. If both real wages and labor productivity increase on the same level, labor's share of the real product remains constant, the real wage increase thus is distributionally neutral. Hence, if CRP in 1913 is 100, higher figures for the 1920s indicate that labor's 'share of the cake' has increased, and the entrepreneur's decreased, respectively.

Voth maintains that the index of industrial prices is relevant to test the question whether entrepreneurs faced wage pressure, not the cost-of-living index as used by Holtfrerich and Ritschl (p. 136). This argument seems plausible concerning the CRP of industry, but not concerning the CRP for the entire economy. As Voth himself shows in his figure 3 (p. 137), the time pattern of the index of industrial prices was more volatile than that of the cost-of-living index. This is not a surprise, as demand for investment goods and consumer durables (which in fact drove the index up[32]) is more elastic than demand for everyday consumer goods. As industrial prices started to fall already in 1929, Voth's CRP for the entire economy indicates a higher value in 1927 than in 1929, which is not plausible and can not be found in any other CRP calculation. Hoffmann constructed two NNP deflators which are used in columns (ix) and (x) below. Yet, one should keep in mind that all CRP calculations for the entire economy, (iv) to (x), may be biased, since we only have data on the nominal hourly wages in industry, not of the economy as a whole.[33]

(B2) Correct or not, does Voth's denominator produce new evidence on labor's share of the domestic product (Table 3)? At a first glance, the multitude

[31] S.N. Broadberry/A.O. Ritschl (1994), 'The Iron Twenties: Real Wages, Productivity and the Lack of Prosperity in Britain and Germany Before the Great Depression', in C. Buchheim/M. Hutter/H. James (eds), *Zerrissene Zwischenkriegszeit. Wirtschaftshistorische Beiträge. Knut Borchardt zum 65. Geburtstag,* Baden-Baden, pp. 15-43, here pp. 17f.

[32] The share of consumer (semi-) durables (furniture, textiles, shoes, etc.) of the index of industrial prices was 57%; see *Vierteljahreshefte zur Statistik des Deutschen Reichs 1932,* 41/1, pp. 139, 142. Prices in this sector had risen rapidly between 1913 and 1925, see *Konjunkturstatistisches Handbuch 1936,* pp. 106f.

[33] Cf. Ritschl (1990), pp. 380f.

Table 3: Cumulative Real Wage Position in Industry and the Aggregate Economy, Germany 1913 and 1925-29

	Industry			Entire Economy						
	Ritschl (i)	Holtfr. (ii)	Voth (iii)	Holtfr. (iv)	Ritschl1 (v)	Ritschl2 (vi)	RitschB (vii)	Voth (viii)	(Hofif.l) (ix)	(Hoff.2) (x)
1913	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1925	115.7	90.3	104.6	97.5	113.4	111.8	108.5	102.6	112.0	113.2
1926	112.7	92.2	106.3	104.0	111.4	110.0	111.9	105.2	111.5	113.7
1927	109.4	91.9	110.2	98.1	114.9	114.2	108.8	115.4	111.6	114.9
1928	119.5	105.8	114.2	103.4	117.2	117.0	115.2	112.1	113.7	117.9
1929	118.8	102.2	116.1	98.9	115.5	115.2	116.5	113.0	115.3	117.3
1925-29	+2.7%	+13.2%	+11.0%	+1.4%	+1.9%	+3.0%	+7.4%	+10.1%	+2.9%	3.6%

Sources: (i), (v) Broadberry/Ritschl (1994), p. 19 (see footnote 36); (ii) calculated from Holtfrerich (1990), p. 73, Table 4.1, cols. 2, 3; (iii), (viii) Voth (1994b), pp. 138f.; (vi), (vii) Ritschl (1990), p. 391, Table 5, cols. III. IV; (ix), (x) calculated as follows: nominal gross hourly wages in industry (W) from Statistisches Bundesamt (ed.) (1972), *Bevölkerung und Wirtschaft 1872-1972,* Stuttgart/Mainz, p. 254; net national product deflators (P), from Hoffmann (1965), p. 601, cols. 14 (ix), 15 (x); output per hour worked (Y/L) from Ritschl (1990), p. 390, Table 4, col. II.

of different CRP figures might be confusing. Yet, three different patterns can be established:

- Holtfrerich's CRP for the entire economy (iv) certainly contradicts Borchardt's thesis of wage pressure: his CRP does not show a substantial gap between real wages and labor productivity either within the late 1920s, or compared to 1913. For a detailed criticism of Holtfrerich's results, see Ritschl (1990).
- RitschTs CRP figures - (i) and (v)-(vii), Ritschl 1 to 3 using alternative output concepts - and the CRPs constructed with Hoffmann's NNP deflators along with Ritschl's productivity data, (ix) and (x), indicate that labor's position already had substantially improved in 1925 as compared to 1913, and continued to do so in the late 1920s.[34]
- Voth's figures, (iii) and (viii), as well as the CRP for industry constructed from Holtfrerich (1990), (ii), indicate that at the beginning of Weimar's stabilization period, 1924/25, CRP was at about its 1913 level or lower. The enormous wage increases of 1927 and 1928 made the CRP jump at least seven percentage points to a level slightly above 100 (Holtfrerich) or more than 110 (Voth).

Concerning Borchardt's wage pressure argument, only Holtfrerich's CRP for the entire economy (iv) contradicts this. All the other CRPs, including Voth's, indicate that labor's share of the real product either improved at some time between 1913 and 1925, or 1927/28. They also, including Voth's again, show a substantial increase in 1927/28, these being the years of the biggest increases of nominal wages both in the private and the public sector of the Weimar Republic.[35] Thus, regardless of whether his calculation method is appropriate or not, it is hard to see how Voth's data should contradict Ritschl's and thus the Borchardt Hypothesis. Obviously, Voth's figures are much closer to Ritschl's than to Holtfrerich's, whose results he claims to confirm (p. 138). An industry lobbyist of the late 1920s having the choice between the CRP calculations of Table 3, would definitely prefer Voth's which show a dramatic increase of labor's share in 1927/28 as compared to both 1913 and 1925. The same holds for Borchardt or Ritschl: none of Ritschl's CRPs underlines the wage pressure hypothesis as clearly as Voth's do.[36] Hence, using the industrial price index instead of the cost-of-living index does not contradict Borchardt and Ritschl, but even supports their arguments.

[34] In Table 3, cols, (i) and (vi) are not taken from Ritschl (1990), to which Voth refers, but from Broadberry/Ritschl (1994). Ritschl seems to have corrected some of his figures slightly. Using Ritschl's 1990 figures would not change the essence of the remarks below.

[35] E.g. Balderston (1993), p. 16, Table 2.4., col. (2).

[36] Voth's argument that one should not take the differences of his figures to 100 too serious due to errors in the underlying macroeconomic statistics (p. 136) seems to be very arbitrary, especially if one looks at his close examination of the .90% and .19% differences in (A3).

The analysis of VotiYs argumentation has shown that his efforts to question the notion of Weimar's investment weakness fail. The method he claims to introduce into the debate is neither new nor the most adequate, the reference period he uses to compare the prewar period with Weimar is arbitrary, and the inferences drawn from the significance tests he uses are unwarranted. Moreover, relating net investment to net real product is a more appropriate measure of an economy's propensity to invest and hence has often been used by the participants in the debate. Using a variety of statistical sources, a more detailed analysis of both Voth's approach and that of conventional economic analysis shows clearly that net investment adjusted by population or real product was considerably lower and much more volatile in the Weimar Republic than in the Empire.

Furthermore, although Voth uses an inappropriate price index when recalculating CRP for the entire economy, his results do not contradict those of Borchardt and Ritschl, but rather underline them. The price index he has chosen for the calculation of industry's CRP seems to be plausible, but again it is impossible to see how his figures should contradict Ritschl's. So Borchardt's wage pressure argument is not rejected, but supported by Voth's results.

(C) For a moment, let us be counterfactual and imagine that Voth had succeeded in revising our assessment of net investment and the cumulative real wage position, that both arguments (A) and (B) were sustainable. What conclusion could be drawn from this? One has to differentiate between the symptoms of a crisis and its causes. For the participants in the Borchardt Debate, his wage pressure hypothesis is one possible cause among many. What is even more important, is that weak investment is only one symptom of crisis among many. Even if Voth had succeeded in showing that these two features did not differ from the prewar period, how can he deny other symptoms of crisis, e.g. high capital costs, low profits, rising foreign debt, permanent current account deficits, »ossification of the economic-political structures«[37], and the precarious situation of the public budgets? And, above all: can a serious economic historian ignore more than two million unemployed in mid-1926 and more than three million in early 1929? I do sympathize with Voth's efforts to have a different look at the *causes* of the irregularities of the Weimar economy, but for the reasons developed above I definitely cannot accept his conclusion that his findings end the ongoing debate. Knut Borchardt and his supporters might or might not be right in their more conservative point of view concerning the causes of Weimar's economic weakness, but their efforts to investigate a period of obvious and serious socio-economic problems should not be regarded as a mock assault on a non-existing problem, as perhaps 19 million registered unemployed in the EU would agree.

[37] Borchardt (1990), p. 132. Cf. on labor market rigidities: B. Eichengreen (1994), 'Wages and the Gold Standard. Perspectives on the Borchardt Debate', in C. Buchheim/M. Hutter/H. James (eds), *Zerrissene Zwischenkriegszeit. Wirtschaftshistorische Beiträge. Knut Borchardt zum 65. Geburtstag,* Baden-Baden, pp. 177-203.